

REMARKS/ARGUMENTS

STATUS OF THE APPLICATION

Claims 21-40 were pending in this application and examined.

Claims 21-40 are rejected under the judicially created doctrine of obviousness type double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 6,608,631.

Claims 21-40 are rejected under 35 U.S.C. §103(a) as being unpatentable over Fowler (USP 5,892,691) in view of Shum et al. (USP 6,271,847; hereinafter "Shum"). The specification is objected to for informalities.

Applicant has amended claim 21 to correct an inadvertently introduced typographical error. Claims 21-40 remain pending in this application after filing of this response.

THE SPECIFICATION

Claim 21 has been amended to correct informalities. Applicant submits that no new subject matter has been introduced by the amendments.

THE CLAIMS

Double Patenting Rejection

A terminal disclaimer is filed herewith to overcome the double patenting rejection.

Rejections under 35 U.S.C. 103(a)

Claim 21

Claim 21 was rejected under 35 U.S.C. 103(a) as being unpatentable over Fowler in view of Shum et al. (USP 6,271,847; hereinafter "Shum"). The Office Action asserts that the various elements of claim 21 are taught by Fowler except that Fowler does not specifically disclose a set of transformations. The Office Action asserts that this feature is taught by Shum and that it would have been obvious to one having ordinary skill in the art to combine Fowler

and Shum because they both relate to methods for generating deformed or warped images and the "warping function" of Fowler may be used to create the warped image in Shum. Applicant respectfully traverses the rejection.

Embodiments of the present invention provide a generalized flexible solution for generating warps. As recited in claim 21, a computer-implemented method is provided for generating a graphical warp through transformation of an undeformed model to a deformed model. The method includes separate steps of receiving information specifying an undeformed model and a set of feature specifications, each feature specification comprising a source feature and a target feature. Further, a set of transformations is received for mapping the source feature to the target feature in each feature specification. Further, a set of strength fields is received for scaling the magnitude of transformations in the set of transformations to generate a set of scaled transformations. A set of weighting fields defined over the undeformed model is received for determining the relative influence of the set of scaled transformations. The deformed model is then generated by applying the set of transformations, the set of strength fields, and the set of weight fields to the undeformed model.

As recited in claim 21, the set of feature specifications and the set of transformations are independently received. Further, the set of strength fields and the set of weighting fields are decoupled and separately received. This provides a warp designer the flexibility to modulate and blend transformations of a model. By allowing the set of feature specifications, the set of transformations, the set of strength fields, and the set of weighting fields to be received in the manner recited in claim 21, an infinite number of deformations may be used on any undeformed model. This provides a generalized and flexible method for performing any number of deformations.

Applicant submits that the above-described features of claim 21 are not taught or suggested by Fowler or Shum considered individually or in combination. Fowler describes a very specific solution for generating deformation weights for application of a deformation function on a model. Fowler presumes that a deformation exists. A warp designer then marks two regions to generate the weighed deformation: a focal region, which responds fully to the deformation, and a falloff region, which responds only partially to the deformation. Fowler

teaches a method for calculating deformation weights for applying the deformation based upon the focal and falloff regions.

Fowler thus appears to only teach a technique for calculating strength field for a specific deformation. Applicant however submits that Fowler does not teach separately receiving a set of strength fields (for scaling the magnitude of transformations in the set of transformations to generate a set of scaled transformations) and a set of weighting fields (for determining the relative influence of the set of scaled transformations), as recited in claim 21.

Further, as previously indicated, Fowler assumes that a deformation exists. As a result, Fowler does not teach receiving a set of feature specifications with each feature specification comprising a source feature and a target feature, as recited in claim 21. Fowler also does not teach a set of transformations (as acknowledged by the Office Action) that map the source feature to the target feature in each feature specification, as recited in claim 21. In fact, Fowler does not appear to teach anything about manipulating the deformation function itself, but presumes that a deformation function exists for calculating the weights. Applicant accordingly submits that Fowler does not teach all the features of claim 21.

Applicant submits that Shum fails to cure the deficiencies of Fowler. Shum describes a system and process for inverse texture mapping using weighed pyramid blending and view-dependent weight maps. Techniques are described for extracting a texture map for each planar surface in a 3D model using an inverse texture mapping process. According to the teachings of Shum, images having cut-out regions can be blended using a weight map associated with each input image to indicate how much each pixel of the image should contribute to the final, blended texture map in order to create seamless texture maps. This is performed by identifying regions of a plurality of 3D images to be texture mapped. A 2D perspective transform is then computed for each identified region and used to warp each identified region to the prescribed texture map coordinates to create a plurality of warped images. A weight map is then created for each warped image. The weight map for an image specifies the degree to which each pixel in the warped image is to contribute to the final blended image. (See Shum: Summary).

Accordingly, Applicant submits that Shum is concerned solely with extracting a texture map from a plurality of 3D models and has nothing to do with warping a 3D model as recited in claim 21. The Office Action suggests that Shum teaches the "set of transformations" recited in claim 21. Applicant however submits that in Shum, a 2D perspective transform is used to warp a region of a 3D model to create a warped image that is then used to determine the weight map. Applicant submits that this 2D transform and "warping" is substantially different from the set of transformations recited in claim 21 that map a source feature to the target feature for each feature specification. In fact, Applicant submits that none of the steps of claim 21 are taught by Shum.

Accordingly, Applicant submits that Shum does not cure the deficiencies of Fowler. Consequently, even if Fowler and Shum were combined as suggested by the Office Action, the resultant combination would not teach the features of claim 21.

Applicant further submits that there is no motivation to combine Fowler and Shum. Fowler and Shum are directed to solving two completely different and unrelated problems. Fowler is directed to generating deformation weights for application of a deformation function that is used to deform a model. Shum, on the other hand, is directed to extracting a texture map from a plurality of 3D models and is not concerned about deforming the models themselves. As described above, in Shum, a 2D perspective transform is computed for a region of a 3D model and used to warp the region to the prescribed texture map coordinates—the transform is not used to deform the model itself. The deformation function of Fowler is thus not the same as the 2D perspective transform of Shum. Accordingly, Applicant submits that it would not have been obvious to one having ordinary skill in the art at the time of Applicant's invention to combine Fowler and Shum.

In light of the above, Applicant submits that claim 21 is patentable over Fowler and Shum, considered individually or in combination.

Claims 22-29

Applicant submits that claims 22-29 that depend from claim 21 should be allowed for at least a similar rationale as discussed for allowing claim 21, and others. The dependent claims also recite additional features that make the claims patentable for additional reasons.

Claims 30-40

Applicant submits that independent claims 30, 32, 34, 37, 39, and 40 should be allowable for at least a similar rationale as discussed for allowing claim 21, and others.

Applicant submits that dependent claims 31, 33, 35-36, and 38 that depend from independent claims 30, 32, 34, and 37 respectively, should be allowed for at least a similar rationale as discussed for allowing the independent claims, and others. The dependent claims also recite additional features that make the claims patentable for additional reasons.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

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